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ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-9889

EXAMINER	
LIANG, GWEN	
ART UNIT	**PAPER NUMBER**
2172	15

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/599,735	WATANABE ET AL.	
	Examiner	Art Unit	
	GWEN LIANG	2172	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,14-18 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,14-18 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. This action is responsive to communications: Amendment C, filed on 03/19/2003.

Claim Objections

2. Claim 1 is objected to because of the following informalities:

With regard to claim 1, the claim language "that are sent from the server" contains grammatical errors because this clause describes "the function" and should be changed to "that is sent from the server".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Regarding claim 5, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3, 15-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ram et al., "Ram" (U.S. Patent No. 5,941,969) and further in view of Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage).

With respect to claim 1, Ram discloses a disk unit ...comprising:

disk storage media for storing data (Abstract, "Each FSP is also connected to one or more disk controllers which in turn manage one or more data storage device.";

a control unit which includes a memory for storing a function and function information relating to execution of the function that are sent from the server, (col. 1 lines 59-64, "The present invention relates to a bridge in a file server which provides a direct link to data storage devices in satisfaction of data requests. The file server has one or more function-specific processors, including network processors (NPs) and file storage processors (FSPs) ..."); (col. 2 lines 9-16, "During operation, client requests are received and analyzed by NPs, and if acceptable, relayed to one of the FSPs which manages [through the use a control unit is inherent] a virtual file system [disk storage media] of mass storage devices connected to the FSP. The local FSP processor determines the location of a buffer on the requesting NP for storing data to be

transmitted and instructs the disk controller [control unit] so that data retrieved by data storage devices is directly deposited into the buffer on the NP over the interconnect bus via the bridge."); (col. 2 lines 20-24, "Upon receipt of the instruction [Storing the function sent from the server in the memory is inherent.], the disk controller [control unit] causes data storage devices to retrieve the requested data [execute the function] and sends the result directly to the buffer of the requesting NP via the bridge. The requesting NP in turn packetizes the result and sends the packets to the requesting client."); (col. 7 lines 33-39, "... the metadata cache [memory] includes information on the type and access mode [Access restriction is inherent.] for the file, the file's owner, the group access identifier, ..., among others."); (col. 8 lines 35-48, "The placement of the XOR engine 296 in the data path allows XOR operations to be performed on the fly without processor intervention [without server process] , thus improving RAID throughput and reducing the RAID write bandwidth load ... The access modes to the bridge buffer 230 that can be selected by address decoding include: Transparent(R/W) mode which is a transparent access to or from the entire bridge buffer 230. It can be used for diagnostic access or transferring unmodified data. [access control]").

However Ram does not explicitly teach a control unit wherein said control unit executes the function in response to a function execution request from the client computer and examines, based on the function information, whether an access from external of said disk unit to the data stored in said disk storage media is allowable or not and restricts accesses to the data stored in the disk storage media from external of said disk unit to the data stored in said disk storage media during execution of the function.

Riedel discloses a control unit which executes the function in response to a function execute request from the client computer (See for example: .Figure 2, wherein the NASD, after executing client-requested function, directly sends data to the client; page 5 lines 5-14, "Allowing such filter functions to operate directly at drives, close to the data, and returning only the relevant fraction of the data to the client, can significantly reduce network utilization and improve overall throughput. In addition to reducing network traffic, applications that scan large objects looking for specific properties or gathering statistics (e.g. counts of matching values) can take advantage of the computational power available at drives by performing these simple operations directly on the drives, thereby offloading the host and increasing the aggregate system power. Applications that fall into this category include text search (e.g. grep), database select, image processing and extraction, association matching for data mining, and spatial data extraction, i.e. any relatively simple function with the potential to significantly decrease the amount of network traffic or host processing required."; page 7 paragraph 4 lines 6-9, "The second function is a scan ( ) which also operates like read ( ) but uses the results of the sample step to provide only data in a specific key range to the requesting client. The scan reads data sequentially from the disk surface, but returns only records in the key range for this client. All other records are stored in on-drive cache buffers until the client responsible for those records issues a request."); and

examines, based on the function information, whether an accesses from external of said disk unit to the data stored in said disk storage media is allowable or not and

restricts accesses to the data stored in the disk storage media from external of said disk unit to the data stored in said disk storage media during execution of the function (It is obvious in Riedel that the NASD has the capability to examine and restrict access from external of the disk unit to the data stored in the disk storage media. On page 3 paragraph 2 lines 19-25, "the server remains responsible for overall file system functionality, but participates only infrequently when new access rights must be tested or cache consistency policies invoked [Gibson97])", wherein it is obvious that mostly the task of examining established access rights is executed by the functions on the disk unit. The motivation of adding this data access restriction capability is discussed in Riedel, page 9 paragraph 2 lines 9-11, "For example, the network-attached drive interface proposed in [Gibson97a] uses a capability system [Gobioff97] to authorize a specific set of operations on data objects on the drive. Protecting data integrity in the face of remote programs can be achieved by requiring remote functions to have capabilities and use the existing system to authorize their access to data objects on the drive."; furthermore, since the main purpose of using a NASD is to offload file system and storage management functionality from dedicated servers (Abstract lines 8-9), it is obvious that the server may also offload its functionality of checking data access rights to the NASD).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a control unit with the function execution and data access control capabilities as disclosed by Riedel in the disk unit as disclosed in Ram. This allows devices more freedom to provide efficient operations; promises more

scalable subsystems by offloading file system and storage management functionality from dedicated servers; ... application-specific code can be executed at storage devices to make more effective use of device, host and interconnect resources and significantly improve application 1/O performance. Remote execution of code directly at storage devices allows filter operations to be performed close to the data; enables support of timing-sensitive transfers and application-aware scheduling of access and transfer; allows management functions to be customized without requiring firmware changes; and makes possible more complex or specialized operations than a general-purpose storage interface would normally support." (Abstract). One of ordinary skill in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

Claim 2 is rejected for the reasons set forth hereinabove for claim 1 and furthermore Riedel teaches that the function is a selection or extraction process in a database (page 6, section 3.1 Database select).

Claim 3 is rejected for the reasons set forth hereinabove for claim 1 and furthermore Ram discloses a disk unit wherein the function is a direct data transfer between the client and disk units without passing through the server (Abstract, "The bridge provides a path between the FSP's internal buses so that, for disk access requests, data from a particular data storage device may be sent by the disk controller via the bridge over the interconnect bus to the NP servicing the request ..."); (col. 2 lines 30-32, "... the bridge provides a direct path between the client and file storage processors which eliminates unnecessary intermediate data routing.").

Claims 15-17 are similarly rejected on grounds corresponding to the reasons given above for claims 1-3.

Claim20 is similarly rejected on grounds corresponding to the reasons given above for claim 1.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage) and further in view of Kanai et al., "Kanai" (U.S. Patent No. 5,862,403).

With respect to claim 14, Riedel discloses a disk unit ...comprising:

disk storage media to store data (See for example: Abstract, "One development in this direction is Network-Attached Secure Disks (NASD) which attaches storage devices directly to the network"); and

a control unit, wherein said control unit receives function execution requests from a client unit via a network (See for example: Abstract, "This allows devices more freedom to provide efficient operations; promises more scalable subsystems by offloading file system and storage management functionality froth dedicated servers; and reduces latency by executing common case requests directly at storage devices", and Figure 2 which illustrates the network connection among Server, Client and NASD; page 5 lines 5-14, "Allowing such filter functions to operate directly at drives, close to the data, and returning only the relevant fraction of the data to the client, can significantly reduce network utilization and improve overall throughput. In addition to reducing network traffic, applications that scan large objects looking for specific properties or gathering statistics (e.g. counts of matching values) can take advantage of

the computational power available at drives by performing these simple operations directly on the drives, thereby offloading the host and increasing the aggregate system power. Applications that fall into this category include text search (e.g. grep), database select, image processing and extraction, association matching for data mining, and spatial data extraction, i.e. any relatively simple function with the potential to significantly decrease the amount of network traffic or host processing required."; page 7 paragraph 4 lines 6-9, "The second function is a scan ( ) which also operates like read ( ) but uses the results of the sample step to provide only data in a specific key range to the requesting client. The scan reads data sequentially from the disk surface, but returns only records in the key range for this client. All other records are stored in on-drive cache buffers until the client responsible for those records issues a request."), and

wherein creates function information to examine accesses from external of said disk unit to an access area for data stored in said storage media at each function execution request, and examines accesses from external of said disk unit to the access area based on said function information, and restricts the access (It is obvious in Riedel that the NASD has the capability to examine and restrict access from external of the disk unit to the data stored in the disk storage media. On page 3 paragraph 2 lines 19-25, "the server remains responsible for overall file system functionality, but participates only infrequently when new access rights must be tested or cache consistency policies invoked [Gibson97])", wherein it is obvious that mostly the task of examining established access rights is executed by the functions on the disk unit. The motivation of adding

this data access restriction capability is discussed in Riedel, page 9 paragraph 2 lines 9-11, "For example, the network-attached drive interface proposed in [Gibson97a] uses a capability system [Gobioff97] to authorize a specific set of operations on data objects on the drive. Protecting data integrity in the face of remote programs can be achieved by requiring remote functions to have capabilities and use the existing system to authorize their access to data objects on the drive."; furthermore, since the main purpose of using a NASD is to offload file system and storage management functionality from dedicated servers (Abstract lines 8-9), it is obvious that the server may also offload its functionality of checking data access rights to the NASD).

However Riedel does not explicitly teach that the control unit receives user ID information and creates function information based on said user ID information.

Kanai discloses the use of user ID information received from a client in creating function information to examine data access requests (See for example: col. 1 lines 59-60, "The central control device 10 [equivalent to a control unit] is a device for coordinating the control of the system as a whole ..."); (col. 13 line 66 – col. 14 line 2, "Thus, the central control device may receive the access requests [function execute requests] either directly from the external of the apparatus, or through the communication control device 6."); (col. 14 lines 9-14, "As the specification of the continuous data, besides the information for identifying each continuous data such as the continuous data name or ID code, ... can be specified."); (col. 14 lines 15-24, "In outline, the central control device 10 admits the access request [Access restriction is inherent.] for the continuous data from a user [In order for the central control device to

admit the access request from a user, it is inherent that the request will be at least partially based on the user ID.] or an application program that is notified by means of a communication via a network,... etc., checks the data memory control device 4 and the communication control device 6 to be used in order to respond to that request, and issues to them commands [creates function information and passes over] for the operations necessary in transferring the requested continuous data [wherein access area restriction is inherent] from the communication path toward the specified transfer destination.").

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include user ID information as disclosed by Kanai in the function information received from the client as disclosed in Riedel in order for the central control device to admit the access request for the continuous data from a user (col. 14 lines 15-24). One of ordinary skill in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

8. Claims 4, 5 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ram et al., "Ram" (U.S. Patent No. 5,941,969), further in view of Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage) and further in view of Deinhart et al., "Deinhart" (U.S. Patent No. 5,911,143).

Claim 4 is rejected for the reasons set forth hereinabove for claim 1. However the combination of Ram and Riedel does not explicitly disclose a list that indicates the accessible area, and wherein said control unit examines whether access to the data is allowable or not based on the list.

Deinhart discloses a disk unit wherein the function information comprises a list that indicates the accessible area, and wherein said control unit examines whether access to the data is allowable or not based on the list (See for example: Abstract and col. 5 lines 4-11).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate data access restriction based on a list of accessible area as disclosed in Deinhart into the disk unit function as disclosed in the combination of Ram and Riedel to provide a system that can user the security system of installed computer systems based on access control lists. (col. 2 line 66 – col. 3 line 2). One of ordinary skill in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

Claim 5 is rejected for the reasons set forth hereinabove for claim 4 and furthermore. Deinhart disclose a list comprising attributes, such as read, write and executable, related to access restriction during function execution (See for example: col. 10 lines 27-36).

Claim 18 is similarly rejected on grounds corresponding to the reasons given above for claim 4.

9. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ram et al., "Ram" (U.S. Patent No. 5,941,969), further in view of Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage) and further in view of Delo et al., "Delo" (U.S. Patent No. 6,363,499).

Claim 7 is rejected for the reasons set forth hereinabove for claim 1 and furthermore Ram discloses a disk unit wherein the control unit monitors whether execution of the function was performed successfully (col. 2 lines 20-23, "Upon receipt of the instruction, the disk controller causes data storage devices to retrieve the requested data and sends the result directly to the buffer of the requesting NP via the bridge [In order for the disk controller to send the result directly to the buffer of the requesting NP, monitoring is inherent.]"). However the combination of Ram and Riedel does not explicitly teach a process of restoring data stored in said disk storage media to its state prior to execution of said function in the case that execution of the function was not successful.

Delo discloses a process of restoring data stored in said disk storage media to its state prior to execution of said function in the case that execution of the function was not successful (col. 16 lines 14-18, "However, once the user decides not to ignore the error, or that the retry is nor working, then the user must choose cancel on an error dialog box [user command], at which point the user is warned that "rollback " is about to occur and then "rollback " occurs.").

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the process of execution failure recovery as disclosed by Delo into the function execution monitoring process as disclosed in the combination of Ram and Riedel to maintain data integrity to provide a method and system for rolling back a computer (See for example: col. 2 lines 34-36). One of

ordinary skill in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

Claim 9 is rejected for the reasons set forth hereinabove for claim 7 and furthermore Ram discloses a disk unit wherein said control unit does not overwrite non-updated data with data updated from the function execution, until the execution of the function is complete. (col. 7 lines 23-27, "In the bridge buffer 230, a memory buffer is partitioned into a metadata cache and a write cache, among others. The write cache buffers [wherein updated data are stored first] writes to the disk drives and thus enhances performance, since memory writes are a magnitude ... faster than disk writes [It is inherent that the updated data will be saved in the write cache memory buffer first and when the execution is over, the write cache will then write the memory updates to the disk, wherein the data has not been updated until this time.]").

Claims 8 and 10 are similarly rejected on grounds corresponding to the reasons given above for claims 7 and 9.

Claim 11 is similarly rejected on grounds corresponding to the reasons given above for claim 9.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ram et al., "Ram" (U.S. Patent No. 5,941,969), further in view of Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage), further in view of Deinhart et al., "Deinhart" (U.S. Patent No. 5,911,143) and further in view of Fong (U.S. Patent No. 6,292,879).

Claim 6 is rejected for the reasons set forth hereinabove for claim 4. However the combination of Ram, Riedel and Deinhart does not explicitly disclose a disk unit wherein said control unit abnormally terminates execution of the function in the case that an access occurs in violation of the access restriction.

Fong discloses a access control method wherein said control unit abnormally terminates execution of the function in the case that an access occurs in violation of the access restriction (col. 4 lines 22-27, "If access is violated, a protection fault results, and the program will not be allowed to continue its execution. FIG. 4 illustrates a method for checking operand data accesses using operand descriptors and terminating a process if access is violated.").

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the access violation handling process as disclosed in Fong into the data access restriction based on a list of accessible area as disclosed in the combination of Ram, Riedel and Deinhart so that when access violation occurs the process will be terminated for protection violation (col. 4 lines 5-7). One of ordinary skill in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

Response to Arguments

11. Applicant's arguments with respect to claims 1-11, 14-18 and 20 have been considered but are moot in view of the new ground(s) of rejection. Although for independent claims, same references are used (i.e. Ram, Riedel and Kanai), new grounds of reasoning have been provided above in this Office Action.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

BACIC, International Patent WO 00/56028: A secure network with sophisticated access controls.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GWEN LIANG whose telephone number is 703-305-3985. The examiner can normally be reached on 9:00 A.M. - 5:30 P.M. Monday and Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KIM VU can be reached on (703) 305-4393. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

G.L.
June 27, 2003

KIM VU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100